An Integrated Approach to Patient Education using 3D Printed Models: A Pilot Study

RWJBarnabas HEALTH | Community Medical Center

Sachin Shah, DO[1]; Estaban Cuartas, MD[2]

[1]Community Medical Center, Toms River, NJ

[2]Montefiore St. Luke's Cornwall Orthopedics, Newburgh, NY

Introduction



- Three-Dimensional (3D) Printing is a process by which **computer generated models are transformed into physical models**
- Material is fused in a layer-by-layer format
- Areas of utilization: **pre-surgical planning, custom implants, and tissue engineering**
- Not widely used, especially in smaller community hospitals
- Little research exists on the benefits of 3D printing to educate patients
- Overall, **patient education improves healthcare outcomes**
- Current methods of educating patients are insufficient (i.e. brochures, articles, etc.)
- Limitations **include health literacy, poor understanding, and lack of interest**

Objectives

- Develop an **affordable** and **convenient** method of 3D printing a replica of patient anatomy
- Utilize the 3D printed model to **educate** patients and improve overall healthcare understanding
- Conduct a pilot study on one patient to assess **material costs and satisfaction** of their 3D printed spine model

Methods

Figure A

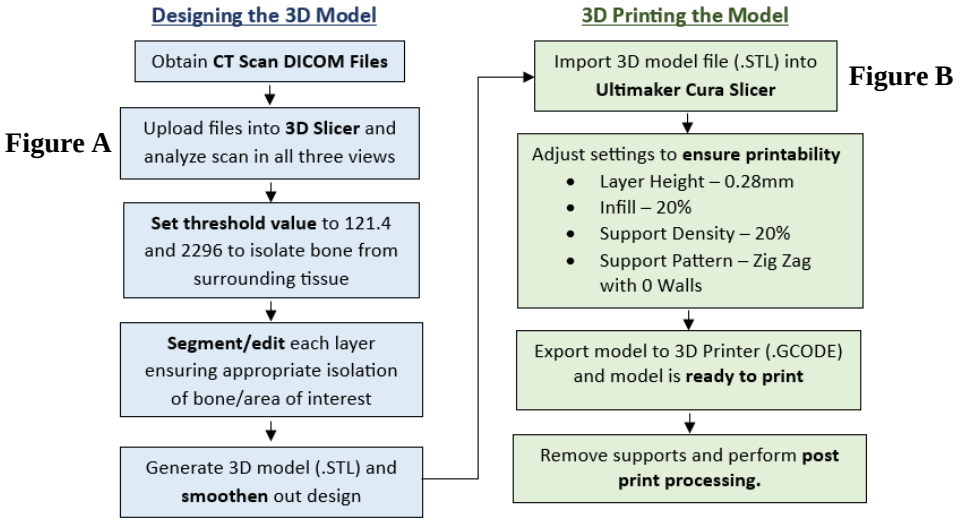


Figure B

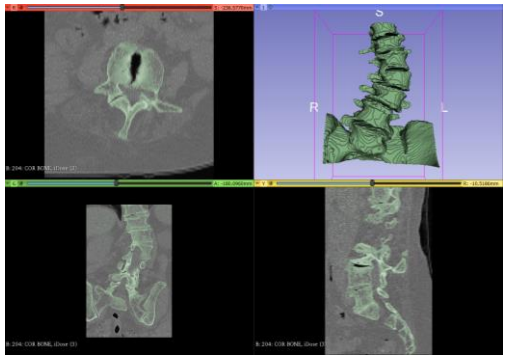


Figure A: 3D Slicer Rendition

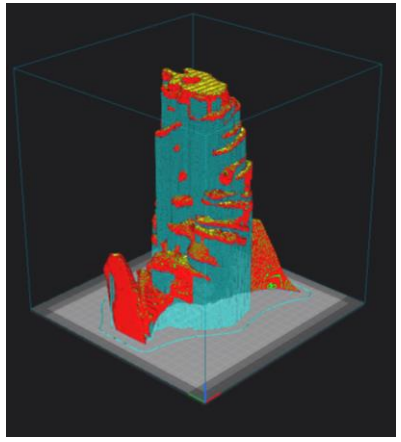


Figure B: Ultimaker Cura Slicer

Results



- Time to print per model: **2.5 days**
- Material per model: **557g of PLA**
- Total material cost per model: **$15**
- Patient demonstrated improved understanding of their diagnosis after seeing 3D replica of their spine
- Patient noted if they had this better understanding of their diagnosis 15 years ago, they would have agreed to undergo surgery earlier, saving them years of pain

Conclusion

- 3D printing patient anatomy is an affordable process that can improve patient education
- The 3D printed spine model helped this patient understand their spinal deformity and the proposed surgery to correct their spine
- Improving patient understanding may allow for earlier intervention, potentially improving health outcomes
- Limitations: qualitative study, small sample size
- Future work: presurgical planning, tumor localization

References

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